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# AN APPROACH FOR ESTIMATING THE BASIC TYPES OF UNEMPLOYMENT IN BULGARIA

This article is an attempt to put into practice a consistent approach for decomposing the aggregate unemployment in Bulgaria using the available statistical information. Investigating the interrelationship between unemployment and vacancies with the help of the so-called "*U-V* approach" the levels of frictional, structural and cyclical unemployment in the aggregate number of unemployed in the country is estimated. The structural unemployment is additionally decomposed into geographical, occupational and mixed geographical/occupational components. The obtained results provide a sound basis for analysing some of the major trends in unemployment dynamics in Bulgaria for the period 2006-2010. Together with the estimation of unemployment at national level, its basic components are studied from a regional perspective with respect to the administrative division of the country into planning regions.

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In the context of EU Member States' recovery from the negative effects of the global financial crisis on socio-economic life and labour market in particular, there exist serious apprehensions that part of the cyclical unemployment caused by the economic downturn, will transform into unemployment of structural character in medium and long term. This is confirmed by the strategic priorities for reducing structural unemployment envisaged in "Europe 2020: A strategy for smart, sustainable and inclusive growth" and the Employment Guidelines for the period 2011-2014. To this end, key role will be played by the active employment policies, effective lifelong learning initiatives and measures for encouraging occupational mobility and regional cohesion aimed at overcoming the mismatch between labour demand and supply regarding educational and qualification characteristics of unemployed.

In this respect, the estimation of the levels of the basic types of unemployment within the aggregate unemployment in Bulgaria can be used as a starting point for allocation of the financial resources intended for labour market revival, among initiatives for encouraging investment activities, improving the quality of employment intermediation services and implementation of training and retraining programmes. In this line of thought, the *aim* of this article is by investigating the interrelationship between unemployment and vacancies to decompose the empirically aggregate Bulgarian unemployment into frictional, structural and cyclical components. The main tasks set for the accomplishment of the so formulated aim determine the structure of the present article, which is structured in two major sections. First, the theoretical framework of the investigation is presented, incl. the concepts for the various types of unemployment together with the theoretical approaches for their differentiation. The research

approach is presented for studying the relation between unemployment and vacancies in the context of the traditional demand and supply framework under disequilibrium conditions. Next, the separate components of unemployment within the aggregate Bulgarian unemployment are identified, while the results derived by decomposing total unemployment into its basic elements are analysed, incl. from regional perspective with respect to the administrative division of the country into planning regions.

## Theoretical framework

Studying the relations between the cyclical development of the economy, on one hand, and the level of employment, on the other, is closely related to the thorough understanding of the different types of unemployment and the factors underlying their manifestation. Economists usually discern three basic types of unemployment, namely frictional, structural and cyclical.[1] Due to its significance, the problem of decomposing empirically aggregate unemployment into its basic components is certainly not new in economic literature. A number of studies in countries different from Bulgaria aimed at measuring and estimating the level of frictional, structural and cyclical unemployment within the aggregate number of unemployed. Some of them[2] used the approach adopted in the present investigation. In others[3] which also make use of the Beveridge curve tools, the differentiation between basic types of unemployment is accomplished on the basis a probability approach for job vacation and occupation in particular investigated local labour markets, related to the so-called Search and Matching Theory.[4]

### *Frictional, structural and cyclical unemployment*

*Frictional unemployment* arises basically due to three types or reasons: 1) the continuous process of job turnover for people within labour force as well as the persistent existence of inflows and outflows from the group of economically active population; 2) imperfect labour market information about job seekers and job vacancies; and 3) the time necessary for unemployed and employers offering job openings to match on the labour market. Even in the cases when labour demand and supply balance is observed, there will inevitably exist a certain level of unemployment due to the fact that job seekers and companies try to find the most suitable job and candidate respectively. If information were perfect and labour

[1] Acoording to some researches the fourth major type is seasonal unemployment. Due to the fact however, that it is relatively short term, here it falls within the category of frictional unemployment.

[2] See Armstrong, Taylor, 1986; Flückiger, Schönenberger, Zarinnejadan, 1986.

[3] See Holzer, 1988

[4] The first works on the theory can be traced as early as the 1970s and naturally evolve in time. The Search and Matching Theory is elaborated on the basis of the idea for job search and matching as a macroeconomic model for studying unemployment and more particularly, frictional unemployment.

mobility were associated with no cost whatsoever, this matching process would occur instantaneously and there would exist no unemployment. As neither of the above conditions is fulfilled, an inevitable by-product of the dynamic labour market is a certain volume of frictional unemployment. Its particular level depends on the job turnover intensity as well as on the speed and effectiveness of successful matching between job seekers and vacancies.

Frictional unemployment has some distinctive characteristics. First, it affects a relatively large number of population from all demographic groups, economic sectors and regions in a given country. Nevertheless, frictional unemployment is not evenly distributed among all of the above-mentioned groups since job turnover is more intensive in some sectors such as construction or retail trade, or among certain demographic groups such as young people. A second major feature of frictional unemployment is the fact that it is usually relatively short term. A significant portion of the people who change their job or seek paid employment for the first time never fall into the group of unemployed. For those who become unemployed nonetheless, the duration of job search period often does not exceed several months. A third characteristic is that a certain level of frictional unemployment is unavoidable. Owing to the considerable volume of labour force inflows and outflows and the continuous process of job turnover, even in condition of perfect balance of demand and supply, it is not possible to reach zero level of unemployment. Finally, frictional unemployment (to a higher degree than other types of unemployment) is associated with both costs and benefits for the economy. For the individual worker, a short period of unemployment can prove a useful investment, if it is related to more intensive and thorough search for paid employment. For the economy a certain level of frictional unemployment is a necessary precondition in order that labour mobility facilitates the effective reallocation of labour force among the different sectors and/or regions of the country. Not all frictional unemployment is beneficial for the individual worker or the economy however, as the case might be with persons, who frequently change one dead-end job for another.

*Structural unemployment* arises as a result of a basic mismatch between the types of vacant jobs and the people who are seeking paid employment. This mismatch may be related to work skills and competences, education and qualification level, geographic area or age. Thus, structural unemployment occurs when the available jobs vacancies in the economy are in highly qualified occupations such as computer programmers, civil engineers or lawyers, while the persons seeking job are either young people with relatively low education and qualification level and work experience, or elderly workers, who have been laid off from low-qualified jobs such as truck driver or labourer in the construction sector. Structural unemployment can also occur when job vacancies are concentrated in one region, while job seekers are located in another region of the country. In this case unemployment is not caused by imperfect information (as in the case with frictional unemployment) but by barriers to mobility between regional labour

markets that impede unemployed workers from competing for available vacant jobs. With structural unemployment, vacant jobs and unemployed persons persistently coexist in the labour market and even in the long run are difficult to match.

There exist several distinctive features of structural unemployment. Unlike frictional and cyclical unemployment, it is usually concentrated among certain groups of people who are negatively affected by technological change, the decline of a major economic sector or the movement of jobs to another region of the country. In addition, structural unemployment is characterised by the fact that it tends to be long-lasting. For workers who have lost their jobs after the introduction of a new technology or a plant closing, there usually exist too limited sources of employment in the respective region, resulting in the circumstance that the job search process may continue for a number of months. As the last point suggests, there is frequently a barely discernible line between the cases of frictional and structural unemployment due to the fact they both involve the process of job search. The major difference is the speed with which the process of search for paid employment is successfully completed – relatively quickly with frictional unemployment and much more slowly with unemployed due to structural reasons.

*Cyclical unemployment* is caused mostly by the insufficient aggregate demand in the economy which, on its part, cannot generate enough jobs for those who seek paid employment. With frictional and structural unemployment the problem is related to the inability to match job seekers with job vacancies. With cyclical unemployment there simply do not exist enough jobs in the economy to balance labour supply. Cyclical unemployment is closely related to the upward and downward movement of the economy respectively in periods of economic upswing and recession as constituent parts of the business cycle. During economic revival, the rate of unemployment gradually declines as a result of the witnessed growth in aggregate consumer and investment expenses and production, which encourages firms to increase employment both by bringing back to work laid-off workers and hiring new employees. With the onset of economic crisis, the pattern is reversed – the decline in sales causes firms to lay off part of the existing employees or cease hiring new ones, which leads to a shortage of vacant jobs and a rise in unemployment. Cyclical unemployment may have a non-cyclical component in the cases when the economy suffers from a condition of chronic low growth, known as “secular stagnation”.

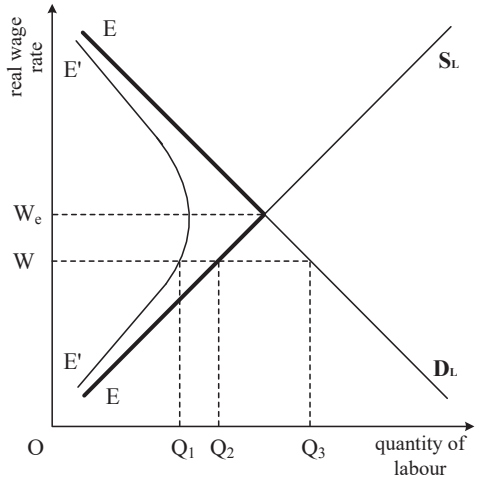
Cyclical unemployment possesses several distinctive features. Unlike frictional and structural unemployment, it exhibits much more clearly expressed year-to-year fluctuations as a result of economic upswings and downturns. Cyclical, like frictional unemployment, as a rule affects the whole economy, although workers in durable goods sectors are generally hit harder than others during recessions. Finally, the duration of cyclical unemployment falls somewhere in between the short-term frictional joblessness and long lasting unemployment due to structural reasons.

*Research approach*

In order that a realistic analysis of unemployment is made, there should be adopted an approach, different from viewing labour market as a homogeneous market structure. For this reason it is necessary to proceed to a decomposition of the labour market into a variety of separate submarkets, possessing a homogeneous labour resource and market-determined wage level, in accordance with certain criteria, which in the present paper are chosen to be geographical and occupational characteristics. It is furthermore assumed that there exists perfect geographical and occupational mobility within each of the so-defined labour markets. It is next adopted the concept of "constrained equilibrium employment level" in each of these submarkets. It considers the volume of labour traded in a given separate submarket to be constrained by either demand or supply when the real wage rate is above or below the equilibrium wage rate respectively. Thus, the thickened bent line *EE* on Figure 1 below represents the employment corresponding to each wage level.

Figure 1

Demand and supply in a given labour submarket




There exists a unique wage level $W_e$, for which actual employment level simultaneously matches labour demand and supply. When the wage level is above $W_e$, there is observed unemployment, while for wage below the equilibrium level there arises labour demand excess and job vacancies appear. In the case under consideration the coexistence of unemployed workers and vacant jobs is not possible due to the assumption for perfect geographical and occupational mobility in each of the labour submarkets.

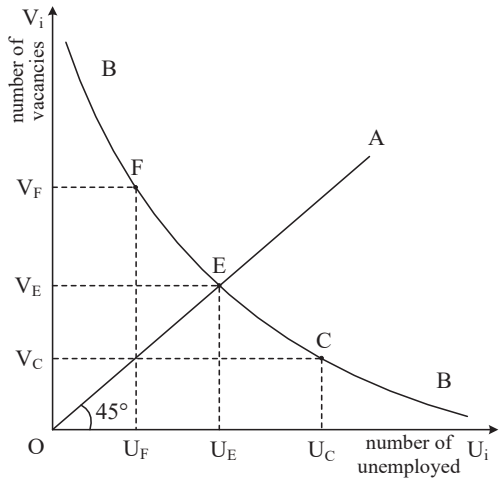
In reality however, labour demand and supply mismatch may arise due to the non-optimal functioning of the labour market. Indeed, in an imperfect world with a variety of transaction and information costs, part of the job vacancies in a certain occupation and a given region may not be taken even in the presence of considerable unemployment, thus generating frictional unemployment. Once we admit its existence, the simultaneous coexistence of unemployed workers and job vacancies becomes possible as the volume of employment falls on neither labour demand nor labour supply curves. This concept can be visualised by constructing a curve *E'E'* on Figure 1 above such that the horizontal difference between *E'E'* and labour demand for each real wage rate (say *W*) represents the number of vacant jobs (measured by the distance $Q_1Q_3$) while the difference between *E'E'* and labour supply is indicative of the number of unemployed ($Q_1Q_2$). Thus unemployment is observed even with the existence of labour demand excess. In the example considered above, vacant jobs are more than unemployed workers ($Q_1Q_3 > Q_1Q_2$) due to the fact that the wage level *W* used in the example is below the equilibrium wage level $W_e$. The last corresponds to a wage level such that the number of job vacancies equals the number of unemployed – a situation in which there is neither excess demand nor excess supply and unemployment is of only frictional character.

*Distinguishing between different types of unemployment*

In the adopted approach for studying separately various labour submarkets decomposed in geographical and occupational aspect, the relation between unemployment and vacancies can be illustrated by the graph on Figure 2 below.

Figure 2

Unemployment and vacancies on labour submarket i

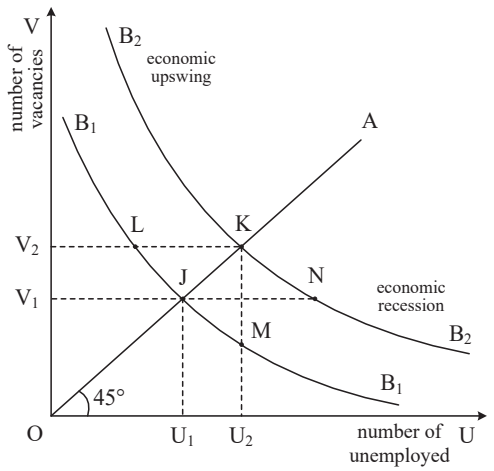


Point *E* represents the unique equilibrium state for which in the considered submarket *i* the number of unemployed equals the number of job vacancies, while both quantities are indicative of the level of frictional unemployment. The last point is based on the assumption that in labour submarket *i* there exists perfect geographical and occupational mobility. All other points on the *BB* curve correspond to situations, in which the labour market in consideration is in a state of disequilibrium. Thus, each point above and to the left of *OA* illustrates a situation of labour demand excess (in conditions of economic upswing when there exists only frictional unemployment), while the points below and to the right of *OA* characterise a case of labour supply excess (in recessions, when besides the frictional unemployment $OU_F$, on submarket *i* there can be evidenced cyclical unemployment $U_FU_C$).

Now we are faced with the task of distinguishing between separate types of unemployment on the aggregate labour market which should not constitute a serious problem from the position of the concept of frictional, structural and cyclical unemployment presented above and the adopted research approach. In practice however, it is not an easy task to discern one type of unemployment from another. One useful approach in this respect is presented on Figure 3 below. Here again, the horizontal axis measures the number of unemployed workers, while the vertical axis represents the number of job vacancies in the economy. Along the 45º line *OA* the number of vacant jobs equal the number of job seekers – a situation in which according to one common definition full employment is observed. As with labour submarket *i* each point above and to the left of *OA* illustrates a situation of excess in labour demand, while a point below and to the right of *OA* characterises a case of excess in labour supply.

Figure 3

Unemployment and vacancies in the economy



Even in the presence of full employment, there exists a certain level of unemployment due to frictional and structural reasons. On the graph below such a situation is illustrated by point *J* on the line *OA*, where full employment is observed together with unemployment at level $U_1$. Figure 3 does not provide information about what type this unemployment actually is – frictional or structural. The job vacancies ($V_1$) are equal to the number of job seekers ($U_1$) but the graph does not show whether the former will be filled quickly enough, which would mean that $U_1$ is frictional unemployment, or will continue to coexist with the latter in the long term, indicating that this is structural unemployment. Most likely, $U_1$ is a combination of both types of unemployment as long as this is one of the many possible levels of unemployment consistent with full employment.

The higher the level of frictional and/or structural unemployment, the further out on the *OA* line the economy will be. Thus at point *K* the level of unemployment has risen to $U_2$, yet the equality between job seekers and vacant jobs is preserved. The simultaneous increase in both vacancies and unemployment can be ascribed to a higher labour force turnover, a longer period necessary for unemployed to find a job or a deeper structural mismatch between the skills desired by employers and those possessed by unemployed. A reduction in frictional or structural unemployment by implementing training programmes by the government or improving the effectiveness of state job placement services will cause a movement of the economy down the *OA* line.

Through each point of the *OA* line a curve convex to the origin of the coordinate system can be drawn such as $B_1B_1$ and $B_2B_2$, known as Beveridge curves, named after the British economist sir William Beveridge (1879-1963) who during the 1940s established the inverse relationship between unemployment and job vacancies. For each stage of labour market evolution, the Beveridge curve shows the vacancies and unemployment dynamics over the business cycle, while his primary objective was to find how far the economy lies from the state of full employment. Certainly, the economic development in the years after the World War II disproves Beveridge's proposition that full employment occurs when the number of job vacancies equals the number of unemployed.

As shown, the position of the economy on the curve is indicative of the business cycle phase of the respective economic system: recessions are usually periods of the economic cycle characterised by high unemployment and job vacancy deficiencies (right lower part of the curve), while in times of economic upswing the number of unemployed declines together with an increase in the number of vacant jobs (left upper part of the curve).[5] The distance of the Beveridge curve from the origin of the coordinate system (e.g. a shift of the curve from $B_1B_1$ to $B_2B_2$) can be used as an indicator of the overall labour market activity level,

[5] In some cases, for the purposes of the comparative analysis, on the horizontal and vertical axes, instead of number of unemployed and job vacancies, the unemployment rate (defined as a relationship between unemployed and labour force) and the job vacancy rate (defined as a relationship between vacancies and the sum of vacant and occupied jobs) are projected.

interpreted as a change in either the intensity of labour market clearing or the sector structure of labour demand.

If we assume for a starting point some state of full employment illustrated by point *J*, in periods of economic upswing the economy moves up the curve $B_1B_1$ to point *L*, at which there is observed an excess demand for labour, indicated by the excess of job vacancies relative to unemployment (even in the tightest labour market with respect to demand for labour there will still be some unemployment due to labour force turnover). Conversely, with the onset of recession, the number of job vacancies declines as firms reduce the volume of hiring, while layoffs cause an upsurge in unemployment – a situation represented by movement down the curve $B_1B_1$ to point *M*, where the number of job seekers is $U_2$. If the economy were at full employment (point *J*), the number of unemployed would be $U_1$. The difference $U_2 – U_1$ therefore measures the amount of cyclical unemployment, while the residue of job seekers within $U_2$ is due to frictional and structural unemployment.

If the unemployment rate increases over time, is it possible to identify the cause for that? From a theoretical point of view the answer is yes, although the deficiency in reliable statistics on unfilled job vacancies might make this task difficult in practice. For example, a rise in cyclical unemployment would be witnessed if there were an increase in the number of unemployed and a decrease in job vacancies, illustrated on Figure 3 by movement down the curve $B_1B_1$ from point *J* to point *M*. An increase in frictional and/or structural unemployment, on the other hand, would occur if there were a simultaneous rise in job vacancies and unemployed, shown by a shift of the Beveridge curve from $B_1B_1$ to $B_2B_2$ (point *J* to point *K*).

There are several ways to determine whether the movement of the economy from one state (point *J*) to another (point *K*) is due to frictional or structural causes. One approach is to trace the dispersion of job vacancies and unemployment. For example, a widespread growth in job vacancies and unemployment across all sectors and regions in the country would point to frictional unemployment; a concentration of job vacancies in one area of the economy and unemployment in another would be indicative of structural unemployment. A second method is to analyse the statistics on the duration of unemployment – an increase in the share of long-term unemployed within the overall number of job seekers would point to the growing significance of structural problems in the economy.

An increase in unemployment may also arise as a result of a combination of cyclical and structural unemployment when, for example, there were widespread plant closings in one industry, with no offsetting increase in vacancies in other sectors of the economy. This is graphically represented on Figure 3 by a horizontal movement from point *J* to point *N*. Part of the high unemployment among workers from the respective industry could be reduced by an increase in aggregate demand, which on its part would help revive the industry in consideration and bring part of the laid-off workers back to their jobs. Another approach to unemployment

reduction would be to create new jobs throughout the other economic sectors, which the laid-off workers might apply for. Even if the economy were to return to full employment (point *K*) as a result of these interventions, however, there still would be evidenced a net increase in the level of structural unemployment, represented by the difference $U_2 - U_1$. The conclusion is that aggregate demand can partially reduce structural unemployment but cannot eliminate it.[6]

If we revert to our task of distinguishing between separate types of unemployment within the aggregate amount of unemployed, the problem is brought down to transposing the considerations expressed in studying submarket *i* to the investigation of the aggregate labour market. The overall number of job vacancies in the economy equals the sum of vacant jobs in the separate submarkets, this also holding true for the total number of unemployed. When unemployment surpasses vacancies ($U > V$), the aggregate labour market faces a situation of excessive labour supply, which usually corresponds to insufficient aggregate demand in the economy. For this reason, the unemployment represented by $U - V$ is of cyclical character, while in the cases when the unemployed are fewer than job vacancies, there is no cyclical component of unemployment.

In a particular submarket, the residual unemployment after determining the level of cyclical unemployment can only be frictional. On the aggregate labour market, as shown on Figure 3 above, this remaining unemployment can be of either frictional or structural nature. By “structural unemployment” for the purposes of the analysis is meant that part of unemployment, caused by the excess in demand (or supply) in a particular geographical/ occupational labour submarket with the simultaneous existence of excess in supply (or demand) in either the same region but in a different occupation or in the same occupation but in a different region or in a different region and a different occupation. Note that the major distinction between frictional and structural unemployment in this situation is that frictional unemployment on the aggregate labour market is consistent with equilibrium in all submarkets, while structural unemployment is generated by the simultaneous existence of excess demand and excess supply in some of the separate labour submarkets.

## Identifying various components within the aggregate unemployment in Bulgaria

The present section of the paper examines the possibilities for decomposing the empirically aggregate unemployment into separate and clearly discernible categories. The deficiencies of the existing statistical information on unemployment and job vacancies in Bulgaria together with the limitations of the adopted approach are discussed. The so-called “*U-V* approach” for distinguishing between frictional, structural and cyclical component of unemployment in Bulgaria is presented below

[6] Wachtel, 1970, p. 5-11.

with a detailed analysis of the results incl. in the context of the division of the country into planning regions.

*Statistics on unemployment and job vacancies in Bulgaria*

The statistical data on unemployment and job vacancies in the country is provided by two institutions – the National Statistical Institute (NSI) and the National Employment Agency (NEA). The NSI data on the level of unemployment in Bulgaria and the distribution of unemployed on the basis of different classifications such as gender, age, place of residence, education, etc. are generated by the so-called "Labour Force Survey". Its main purpose is to provide information about the most important characteristics of employment and unemployment in the Republic of Bulgaria by conducting periodic representative labour force surveys. In the official issues of the "Labour Force Survey" however, no data on the occupational structure of unemployment are presented. NSI provides information about job vacancies by conducting the "Survey on the Employees under Labour Contract and Average Wages and Salaries", where the statistical data on vacant jobs are decomposed by economic sectors, occupational groupings and planning regions.

For the purposes of the present analysis and the categorisation of the aggregate unemployment into its major components an unpublished statistical information, provided by NEA is used. Although thorough information is presented on the demand of labour and the unemployed registered in the labour offices by variables such as place of residence, gender, age, educational and qualification level, right of compensation etc., the available statistical data allow the decomposition of unemployment and vacancies into only six geographical units (planning regions) and nine occupational categories. Thus, for each year within the studied period 2006-2010, two types of two-dimensional tables for the six statistical regions and the nine major occupational groupings are constructed, reflecting the geographical and occupational distribution of the unemployed registered in the local NEA offices (calculated on annual basis by aggregation of average monthly data) and the job vacancies declared by employers (calculated cumulatively).

*Methodological approach*

The *U-V* approach, used in the present article, is described in details below in this section. As it was clarified above, the calculations are made on the basis of statistical data for the period 2006-2010. The method comprises identifying the various types of unemployment within the aggregate number of unemployed by investigating the ratio between job vacancies and unemployed workers. As it will become clear below, first the frictional component of unemployment is determined, then the structural (geographical, occupational and mixed geographical/ occupational) and finally the cyclical one.

The adopted approach is definitely not lacking limitations and deficiencies. First, the obtained results depend to a certain extent on the order in which the various

components of unemployment are determined. A possible criterion in this respect is the period and degree to which the macroeconomic policies and active employment measures can contribute to reducing the respective type of unemployment. According to this criterion it can be assumed that frictional unemployment should be determined first, while the amount of the mixed geographical/occupational component of unemployment is appropriate to be identified after determining separately the geographical and occupational unemployment.

Second, it cannot be claimed with absolute certainty whether geographical structural unemployment is affected by measures taken within the active employment policy more readily than occupational unemployment. For this reason the results in this article are presented in two versions depending on whether geographical component of structural unemployment is determined before or after the occupational one.

As a drawback of the used approach there can be pointed out the assumption made above that there exists perfect geographical and occupational mobility in each single submarket with homogeneous labour resource and market-determined wage level in accordance with certain criteria, subject to critiques from a practical perspective. The reason is that the so-defined model does not take into account the distribution of unemployment and vacancies by economic activity groupings as a factor, affecting the mobility of labour force.

Finally the adopted research approach does not generate realistic results and hence cannot be applied using the average annual data on job vacancies by statistical regions and occupational groupings, presented in the Quarterly Survey on the Employees under Labour Contract and Average Wages and Salaries conducted by NSI. For this reason the purposes of the analysis require the usage of the annual data on the declared vacant jobs, provided by the NEA, which according to the methodology used by the Agency are calculated cumulatively.

*The U-V approach – a procedure for calculating the various components of unemployment*

By presenting two-dimensional tables, containing statistical information on unemployment and vacancies, as matrices *U* and *V* respectively (with elements $u_{ij}$ and $v_{ij}$, corresponding to occupation '*i*' and planning region '*j*'), frictional, structural (geographical, occupational and mixed geographical/occupational) and frictional components of unemployment are determined in the following manner:

(1) First, each element of *U* is compared to the corresponding element of *V* and the smaller of the two takes the place of the corresponding element in *F*, representing the frictional unemployment matrix. The sum of the elements $f_{ij}$ of the matrix constitutes the aggregate amount of frictional unemployment in the country. Thus,

$$f_{ij} = \min(u_{ij}, v_{ij}) .$$

(2) Then, *F* is consecutively subtracted from *U* and *V* in order to obtain *U'* and *V'* matrices, containing the residual unemployment and vacancies respectively, i.e.:

$$u'_{ij} = u_{ij} - f_{ij},$$

$$v'_{ij} = v_{ij} - f_{ij}.$$

(3) In order to determine the geographical component of unemployment (here, the case in which the geographical element of structural unemployment is determined before the occupational one is considered), each row of *U'* is compared to the corresponding row of *V'*. If the sum of the elements of a given row of *U'* is larger than the sum of the elements of the corresponding row of *V'*, then for this row, all remaining vacancies are distributed to the unemployed proportionally to the number of the remaining unemployed in each planning region. Otherwise, all residual unemployment on the respective row is caused by geographical mismatch between labour demand and supply. If the sum of either of the corresponding rows of *U'* or *V'* is equal to zero, then all elements of the corresponding row of *G* (the geographical unemployment matrix) will also be equal to zero. The overall amount of geographical structural unemployment in the country is obtained as a sum of the elements $g_{ij}$ of the *G* matrix. Analytically,

If $\sum_j u'_{ij} > \sum_j v'_{ij}$ and $\sum_j u'_{ij} \neq 0$, then $g_{ij} = \frac{\sum_j v'_{ij}}{\sum_j u'_{ij}} \cdot u'_{ij}$ (for $\sum_j v'_{ij} = 0$, $g_{ij} = 0$),

if $\sum_j u'_{ij} \leq \sum_j v'_{ij}$, then $g_{ij} = u'_{ij}$,

if $\sum_j u'_{ij} = 0$, then $g_{ij} = 0$.

(4) After having determined the geographical component of unemployment, the matrices containing the residual unemployed and vacancies, namely *U''* and *V''* are calculated. Thus,

$$u''_{ij} = u'_{ij} - g_{ij},$$

$$v''_{ij} = \left(1 - \frac{\sum_j u'_{ij}}{\sum_j v'_{ij}}\right) \cdot v'_{ij} \text{ if } \sum_j v'_{ij} \neq 0 \text{ and } \sum_j v'_{ij} \geq \sum_j u'_{ij},$$

$v''_{ij} = 0$, otherwise.

(5) Next, in order to determine the occupational component of unemployment, the corresponding columns of *U''* and *V''* are compared. If the sum of a given column of *U''* is larger than the sum of the corresponding column of *V''*, then all remaining vacancies for this column are distributed to the unemployed proportionally to the number of the remaining unemployed in each occupation.

Otherwise, all residual unemployment on the respective column is caused by occupational mismatch between labour demand and supply. If the sum of either of the corresponding columns of *U''* or *V''* is equal to zero, then all elements of the corresponding column of *O* (the occupational unemployment matrix) will also be equal to zero. The overall amount of occupational structural unemployment in the country is obtained as a sum of the elements $o_{ij}$ of the *O* matrix. Analytically,

If $\sum_i u''_{ij} > \sum_i v''_{ij}$ and $\sum_i u''_{ij} \neq 0$, then $o_{ij} = \frac{\sum_i v''_{ij}}{\sum_i u''_{ij}} \cdot u''_{ij}$ (for $\sum_j v''_{ij} = 0$, $o_{ij} = 0$),

if $\sum_i u''_{ij} \leq \sum_i v''_{ij}$, then $o_{ij} = u''_{ij}$,

if $\sum_i u''_{ij} = 0$, then $o_{ij} = 0$.

(6) After having calculated the occupational component in the aggregate composition of unemployed in the country, the residual unemployment is of either mixed geographical/occupational or cyclical character. The matrices of the remaining unemployment and vacancies, *U'''* and *V'''* respectively, are obtained in the following manner:

$u'''_{ij} = u''_{ij} - o_{ij}$,

$v'''_{ij} = \left(1 - \frac{\sum_i u''_{ij}}{\sum_i v''_{ij}}\right) \cdot v''_{ij}$ if $\sum_i v''_{ij} \neq 0$ and $\sum_i v''_{ij} \geq \sum_i u''_{ij}$,

$v'''_{ij} = 0$, otherwise.

(7) If no cyclical unemployment is available (i.e. the overall number of job vacancies exceeds that of the unemployed), than it is considered that the whole amount of the remaining unemployment is of mixed geographical/occupational character. Otherwise (i.e. if the total number of unemployed is greater that the number of vacant jobs), the residual vacancies are distributed to the residual unemployment and the unemployed thus allocated constitute the mixed geographical/occupational component of unemployment, denoted by the matrix *M*. Thus,

If $\sum_{i,j} u_{ij} > \sum_{i,j} v_{ij}$, then $m_{ij} = \frac{\sum_{i,j} v'''_{ij}}{\sum_{i,j} u'''_{ij}} \cdot u'''_{ij}$,

if $\sum_{i,j} u_{ij} \leq \sum_{i,j} v_{ij}$, then $m_{ij} = u'''_{ij}$.

(8) Finally, the cyclical element of unemployment, namely the matrix *C* is derived by subtracting *F*, *G*, *O* and *M* from *U*. The overall amount of the cyclical unemployment in the country is obtained as a sum of the elements $c_{ij}$ of the *C* matrix. Thus,

$$c_{ij} = u_{ij} - f_{ij} - g_{ij} - o_{ij} - m_{ij}.$$

The case of calculating the occupational element of structural unemployment before the geographical one is analogous to the procedure presented above. The only difference is the chronological interchange of the places of steps (3) and (4) with those of steps (5) and (6) respectively.

*General results from the conducted research*

The general results from the research are presented in Tables 1 and 2 below as absolute values and percentage structure depending on the order of determining geographical and occupational component of structural unemployment.

*Table 1A*

Unemployment in Bulgaria by types when the geographical component of unemployment is determined before the occupational one (amount)

| Types of unemployment | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| Frictional | 195 131 | 163 840 | 132 167 | 129 870 | 129 963 |
| Structural, incl.: | 84 472 | 92 667 | 101 552 | 94 525 | 57 832 |
| Geographical | 10 692 | 21 313 | 17 521 | 7 608 | 4 176 |
| Occupational | 26 566 | 20 774 | 24 986 | 36 567 | 49 489 |
| Mixed | 47 215 | 50 580 | 59 044 | 50 351 | 4 167 |
| Cyclical | 76 451 | 30 473 | 0 | 56 585 | 163 149 |
| Total | 356 054 | 286 980 | 233 719 | 280 980 | 350 944 |

*Source:* NEA (unpublished input data) and author's own calculations.

*Table 1B*

Unemployment in Bulgaria by types when the geographical component of unemployment is determined before the occupational one – structure (%)

| Types of unemployment | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| Frictional | 54.8 | 57.1 | 56.5 | 46.2 | 37.0 |
| Structural, incl.: | 23.7 | 32.3 | 43.5 | 33.6 | 16.5 |
| Geographical | 3.0 | 7.4 | 7.5 | 2.7 | 1.2 |
| Occupational | 7.5 | 7.2 | 10.7 | 13.0 | 14.1 |
| Mixed | 13.3 | 17.6 | 25.3 | 17.9 | 1.2 |
| Cyclical | 21.5 | 10.6 | 0.0 | 20.1 | 46.5 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

*Source:* NEA (unpublished input data) and author's own calculations.

*Table 2A*

Unemployment in Bulgaria by types when the occupational component of unemployment is determined before the geographical one (amount)

| Types of unemployment | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| Frictional | 195 131 | 163 840 | 132 167 | 129 870 | 129 963 |
| Structural, incl.: | 84 472 | 92 667 | 101 552 | 94 525 | 57 832 |
| Occupational | 27 961 | 22 853 | 26 873 | 38 955 | 50 063 |
| Geographical | 8 650 | 18 447 | 16 663 | 5 502 | 2 238 |
| Mixed | 47 862 | 51 367 | 58 016 | 50 069 | 5 530 |
| Cyclical | 76 451 | 30 473 | 0 | 56 585 | 163 149 |
| Total | 356 054 | 286 980 | 233 719 | 280 980 | 350 944 |

*Source:* NEA (unpublished input data) and author's own calculations.

*Table 2B*

Unemployment in Bulgaria by types when the occupational component of unemployment is determined before the geographical one – structure (%)

| Types of unemployment | 2006 | 2007 | 2008 | 2009 | 2010 |
|---|---|---|---|---|---|
| Frictional | 54.8 | 57.1 | 56.5 | 46.2 | 37.0 |
| Structural, incl.: | 23.7 | 32.3 | 43.5 | 33.6 | 16.5 |
| Occupational | 7.9 | 8.0 | 11.5 | 13.9 | 14.3 |
| Geographical | 2.4 | 6.4 | 7.1 | 2.0 | 0.6 |
| Mixed | 13.4 | 17.9 | 24.8 | 17.8 | 1.6 |
| Cyclical | 21.5 | 10.6 | 0.0 | 20.1 | 46.5 |
| Total | 100.0 | 100.0 | 100.0 | 100.0 | 100.0 |

*Source:* NEA (unpublished input data) and author's own calculations.

On the basis of these tables, the following conclusions can be made:

(1) The results demonstrate that the amount of frictional unemployment in Bulgaria considerably decreases over the period 2006-2010 as until 2008 inclusive (before the onset of the financial and economic crisis in the country) this is related to the overall reduction of the aggregate number of unemployed in the country. For the rest of the investigated period the level of frictional component of unemployment remains relatively stable. With respect to the unemployment structure, until 2008 a general increase in the share of frictional unemployment is observed, the causes for this lying in two major aspects. First, the economic upswing during the period and the swollen labour demand encourage the employed to seek better opportunities for paid employment and respectively prompt the unemployed to spend longer periods of time in search of the vacant job which is most suitable for them. On the other hand, for the period 2006-2008 there were registered favourable development trends in economic sectors with

high turnover such as construction and retail trade. After 2008 the share of frictional unemployment in the aggregate amount of the unemployed in the country sharply decreased mainly due to the desire on part of the employed for keeping their jobs and ensuring a certain level of labour income together with the propensity of unemployed to accept more unsatisfactory working conditions and wage levels while searching for paid employment in the context of the economic crisis.

(2) Regarding the dynamics of structural unemployment it can be inferred that its level as well as the share of this component of unemployment within the aggregate number of unemployed follow similar trends, namely: increase until the middle of the investigated period and reduction in the years after 2008. Here again the reasons can be found in the cyclical development of the economy. This time however, the trends observed were not caused by the preferences of job seekers (whether employed or unemployed) with respect to the working conditions and wage levels, but rather by the mismatch between labour demand and supply in geographical and occupational/qualification aspect. Indeed, in periods of economic upsurge, such as the years until 2008, the process of job creation was highly intensive, while part of the new job openings were in such sectors and/or regions, where the supply of labour could not meet the new educational and qualification requirements of the changing demand.

(3) The analysis of the results with respect to the composition of structural unemployment and its constituting elements, namely geographical, occupational and mixed geographical/occupational components shows the following trends. First, the derived data reveal that irrespective of the order of calculation, the occupational component of structural unemployment is generally larger than the geographical, the latter possessing the lowest share among the three elements of structural unemployment. This trend is very clearly expressed in the last years of the investigated period and particularly in 2010, when given the evidenced high level of unemployment, the inability of employers to find the suitable candidates for a given job opening was caused mostly by the mismatch between their labour demands and the occupational and qualification characteristics of the unemployed. Moreover, the obtained results indicate that the limited geographical labour force mobility was the factor that least affected the structural inconsistencies between the labour demand and supply in Bulgaria for the period under consideration.

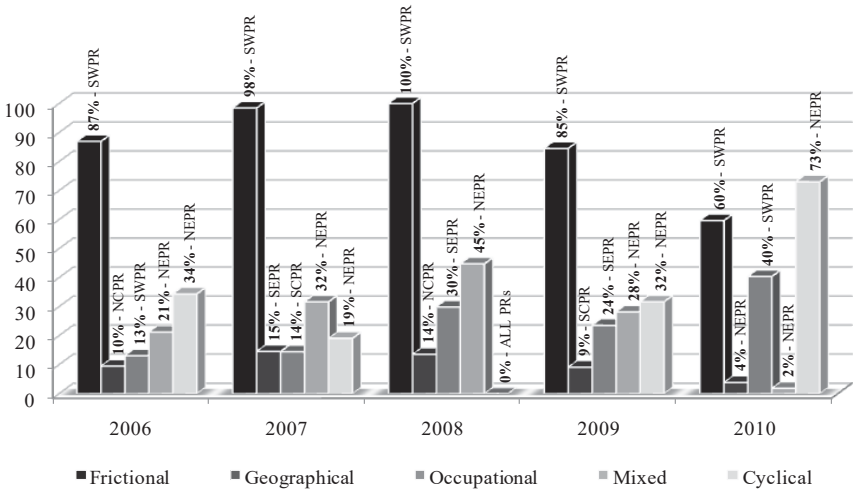
(4) The level and share of cyclical unemployment in the country reached their peak in 2010 when the negative impact of the global economic crisis on the labour market was most acute. This was the period of most considerable mass layoffs, caused by the contracted activities of enterprises following the aggregate demand deficiency, when the cyclical component reached almost half of the amount of the aggregate employment. At the other extreme with respect to the cyclical unemployment dynamics was 2008 when the job vacancies exceeded the unemployed and according to the adopted research approach there was no cyclical unemployment.

*Regional aspects of the analysis*

In this section of the article, the results obtained during the decomposition of aggregate unemployment into its major components are analysed from regional perspective with respect to the administrative division of Bulgaria into planning regions (PRs). The results presented on Figure 4 below are intended to demonstrate in which of the statistical regions the share of the respective type of unemployment for the respective year of the period in consideration is the highest. The derived data give rise to the following general conclusions about the regional structure of the basic elements of unemployment in the country for the period 2006-2010.

Figure 4

Shares of the types of unemployment (in %) within the aggregate numberof unemployed in Bulgaria for the period 2006-2010 – maximum values by planing regions




(1) Regarding the structure of aggregate unemployment it can quite reasonably be claimed that in the South-West Planning Region (SWPR) there predominates the frictional unemployment, its share varying between 60% and 100% for 2010 and 2008 respectively. The reason for the so-identified trend can be found in the high level of urbanisation of the SWPR where the capital of Bulgaria is situated. There, according to NSI data in 2010 the share of labour force living in urban areas was highest compared to the other planning regions and reached 84.5% of the total amount of employed and unemployed.[7] As an additional

[7] NSI. Employment and Unemployment – Annual Data 2010

argument in favour of the observation made, the fact can be pointed that in the labour market structure by economic sectors in SWPR the services sector predominated with 72.6% of the occupied jobs for 2010[8] as per this indicator the region is again leading the other planning regions in the country.

(2) As far as the elements of structural unemployment are concerned, the share of the mixed geographical/occupational unemployment in the aggregate number of unemployed is the highest in the North-East Planning Region (NEPR) compared to the other regions through the investigated period. Apparently in NEPR the structural mismatch between labour demand and supply can be overpowered only by simultaneous increase in the geographical and occupational labour force mobility. The reason is that in this region there not only exist job vacancy deficiencies which cannot absorb unemployment, but in the regional economy structure there prevail economic activities that experience difficulties throughout the country such as manufacturing and accommodation and food service activities.

The results obtained from the conducted regional analysis of the structure of unemployment reveal that NEPR is the most susceptible with respect to the economic development cycle – for the period 2006-2010 the cyclical component of unemployment was the highest in that particular region. Here again the reason can be found in the regional economy structure as well as in the degree in which the economic crisis affected the various economic activities. According to NSI data for 2010 the sharpest reduction in the number of employees was registered in the industrial sector (15.6% on annual basis) as the economic activities with the largest absolute cutback on employed were those of manufacturing and construction. For the services sector the evidenced decline for the same period was 13.5%, while the most heavily affected economic activities here were "wholesale and retail trade; repair of motor vehicles and motorcycles" and "accommodation and food service". [9]

## Conclusion

The present article constitutes an attempt to put into practice a consistent approach for decomposing the aggregate unemployment in Bulgaria using the available statistical information. The application of the so-called "*U-V* approach" of disaggregation allows for estimating the levels of frictional, structural and cyclical unemployment in the aggregate number of unemployed in the country. The obtained results provide a sound basis for analysing some of the basic trends in unemployment dynamics in Bulgaria for the period 2006-2010. The categorisation of unemployment may prove a source of useful information with respect to the elaboration and

[8] NSI. Quarterly Survey on the Employees under Labour Contract, Working Time and Average Wages and Salaries – Annual Data 2010

[9] NSI. Quarterly Survey on the Employees under Labour Contract, Working Time and Average Wages and Salaries – Annual Data 2010

application of strategic priorities in the field of labour market due to the fact that the effectiveness of the implemented active employment policies depend to a large extent on the thorough understanding of the nature of unemployment.

Notwithstanding all these considerations, however, it should be pointed out that the results, obtained by investigating the interrelationship between unemployment and vacancies have to be interpreted with certain caution because of the fact that their reliability largely depends on the quality of the used statistical information. Bearing in mind the unsatisfactory condition of national statistics in Bulgaria, incl. in the field of employment and unemployment, each improvement in this respect can enhance the reliability and applicability of the derived results. And finally, possible future research could be focused on estimating the optimal structure of unemployment in the labour market in Bulgaria with respect to the geographical and occupational labour force mobility in the country.

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